# Alton-Baker Hot Compost Team 2010

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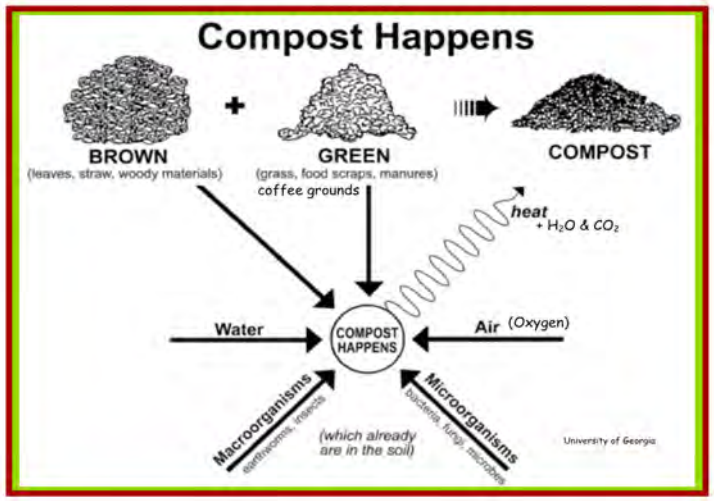
Photography by Barclay Browne
& Anne Donahue

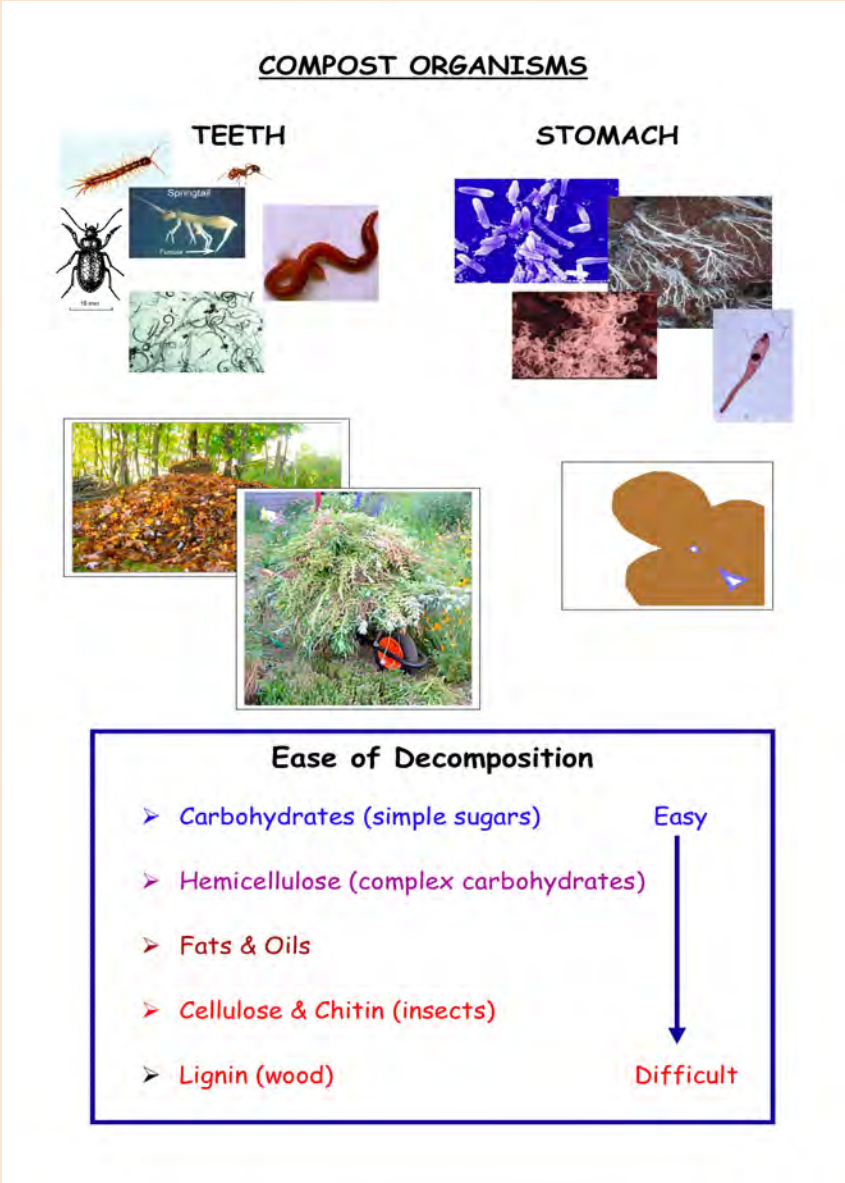
We are using a cattle panel (with chicken wire inside to prevent material from falling out of the bin) & passive aeration.  Aeration consists of a perforated horizontal bottom pipe connected with a tee to a perforated vertical pipe.

Compost happens, but how? Plants contain about 40 x more carbon (C) than nitrogen (N). Here are the organic feedstocks we're using. Water, oxygen, and microbes are also required.



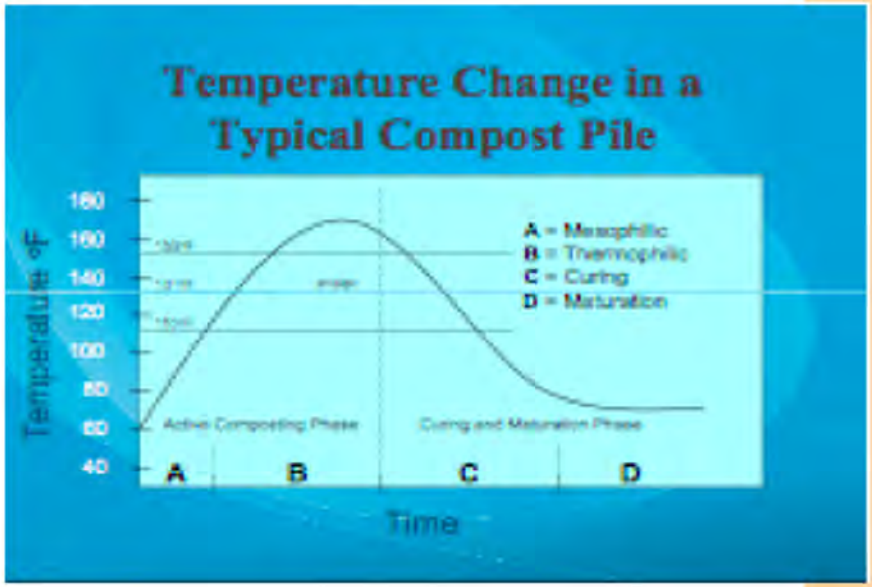

## Our Organic Ingredients:

- ✓ Garden weeds, plants, vegetables, fruits
- ✓ Leaves
- ✓ Manure
- ✓ Coffee Grounds




We don't make compost; we create a livable environment for other organisms to do this work. Larger creatures such as beetles & ants work as "teeth" to physically break material into smaller pieces from which bacteria, fungi, & protozoa (the "stomach") then absorb nutrients.

What temperatures will we observe in our compost?




- **Thermophilic bacteria**
  break down PROTEINS, FATS, CELLULOSE, & HEMICELLULOSE
- **Mesophilic bacteria**
  break down soluble, easily degradable SUGARS & STARCHES
- **Actinomycetes & Fungi**
  attack LIGNIN & CHITIN

Our pile will start at ambient temperature, but as the microbes metabolize the organic matter, heat will be released. Temperatures up to 130 º are referred to as mesophilic. Thermophilic temperatures occur above 130º. We will use these temperatures to speed the composting process & to kill weed seeds & pathogens.

# Are we going to turn our pile?

No, we're going to use the heat generated by the microbes to create a convection current with our perforated pipes. Oxygen will be pulled from outside the pile through the material. So, what is the optimal environment for creating compost?

# Optimal Compost Conditions

**Particle Size:** 1"-2"

⇒ No grinder; 1"-4"

- **Moisture:** 50-60%

⇒ Microorganisms live in a film of $H_2O$

⇒ Below 40% moisture, composting stops

- **Oxygen** <10%

⇒ Provided by perforated pipe

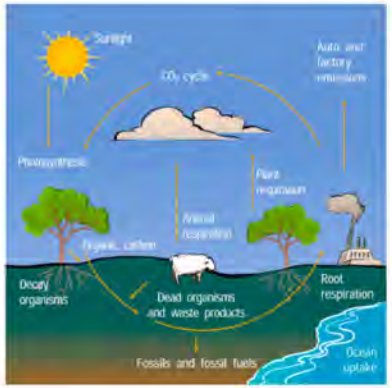
⇒ Low/no oxygen means *BAD SMELLS*

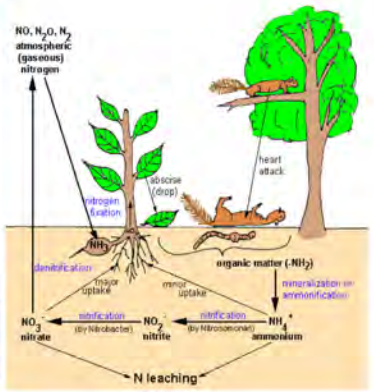
**Temperatures** 131°-150° F

⇒ These temps. kill pathogens & seeds

- **C:N Ratio** 25:1

⇒ Mixing well in correct proportion




Let's look at each of these...

# Particle Size

If you swallowed an apple whole, your stomach acid & digestive system microbes, would eventually consume it.

If you swallowed an equivalent amount of applesauce, the same thing would happen--much more quickly & with less upset.

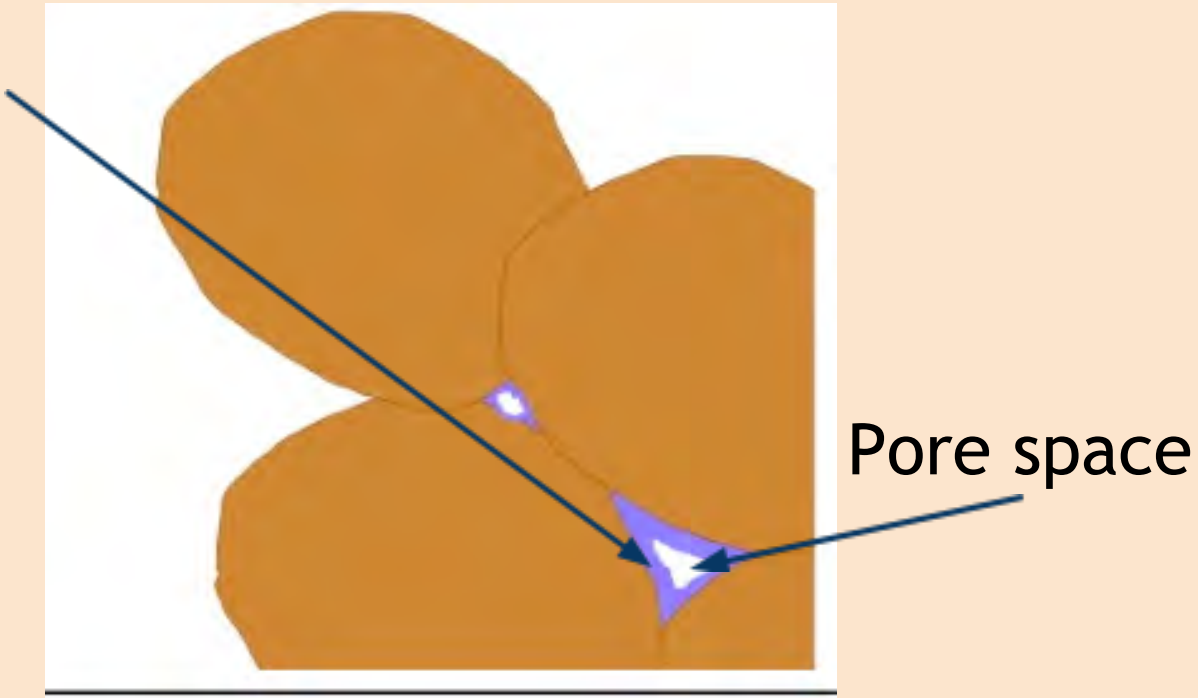
The apple has less surface area than the same mass of applesauce. The microbes & stomach acid have MORE surface of applesauce to work on.

We need to chop large material into smaller pieces.  One to 2" are optimal, but don't worry this excessively.  Larger pieces will compost; it just takes longer.

A pile mix with variably sized pieces will lessen the amount of compaction--that means better aeration (more oxygen for our microbes friends).

# Moisture & Oxygen

Microbes live in the film of water bonded to the surface of tiny particles. If the moisture in our pile falls below 40%, the film of water evaporates. Our microbes now have no more home.




The microbes we want need oxygen to metabolize organic matter. The pore spaces of our pile will be filled with water (and not oxygen) if the moisture content is greater than 60%. When that happens, the anaerobes will take over & the pile will SMELL!

After mixing, put a softball size glob in your hands. If, when you squeeze with both hands as hard as you can, a couple drops of water come out, the moisture is right.

If your gloves are still dry after squeezing, add a little water & test again. It should be about like a very damp (not dripping) sponge.

# Temperature


We want the microbes in our pile to metabolize organic matter rapidly. As they do so, they break chemical bonds, & that releases heat. Temperatures above 131 degrees F for more than three consecutive days kill human pathogens. Temperatures of about 145 degrees kill weed seeds & plant pathogens. Heat speeds the composting process. We will be recording our pile temperatures.

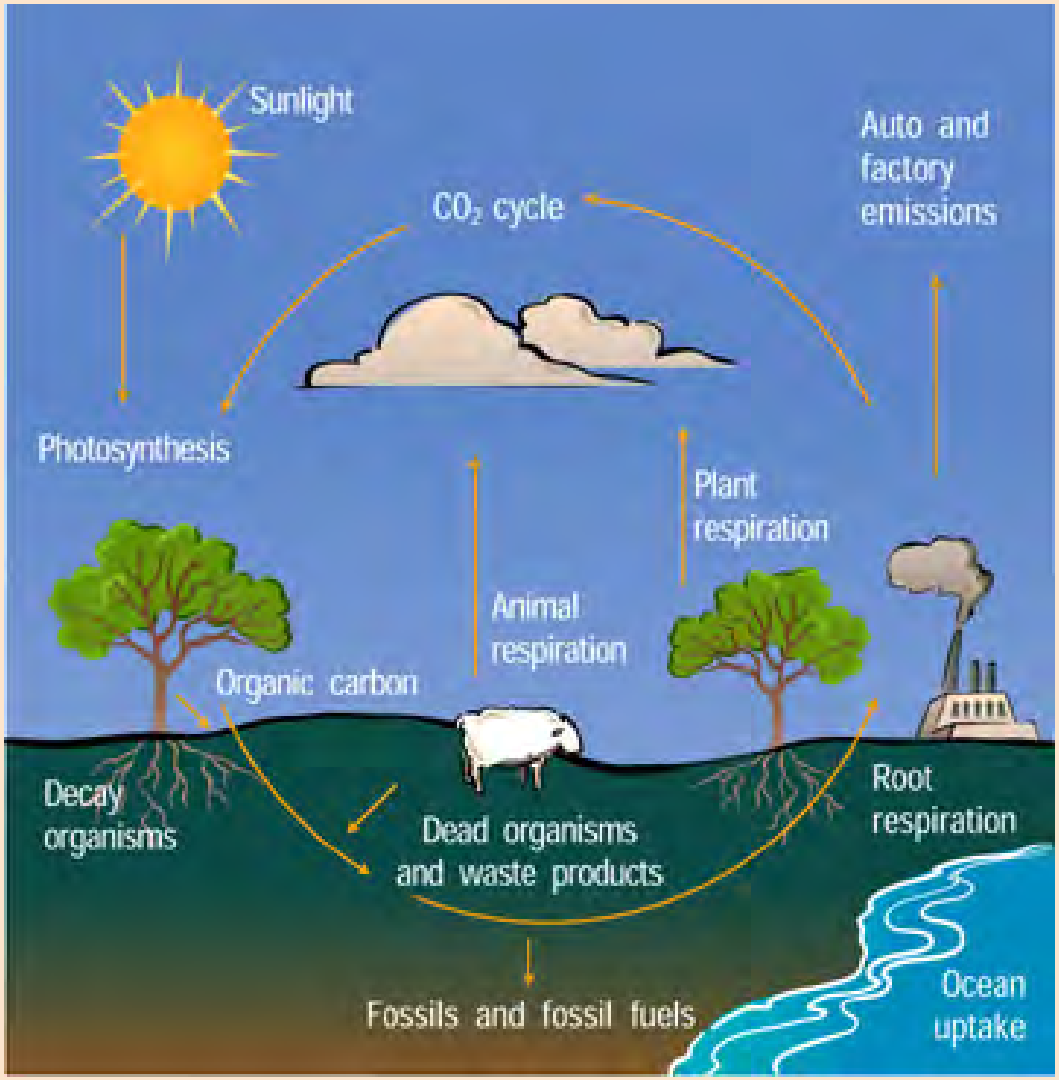
# Carbon(C):Nitrogen(N) Ratio

The word carbohydrate's root is *carbon*. Think sugar, starch, cellulose, insect skeletons (chitin), & lignin (wood). Microbes need many more parts of carbon (C) than nitrogen. Carbon feedstocks are frequently brown in color.

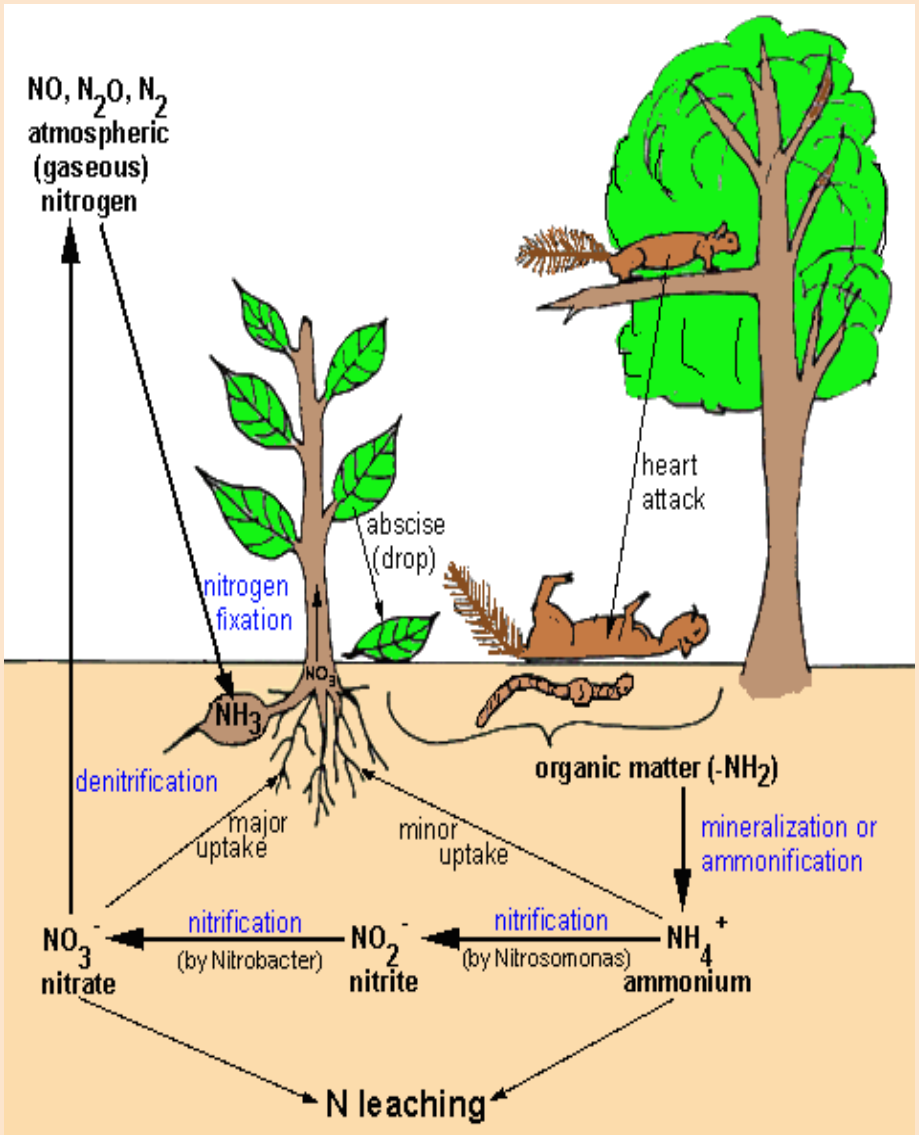
However, microbes need nitrogen (N) also, just less. These feedstocks are often, but not always, green. Chlorophyll (the green molecule in plants) has lots of nitrogen in it.

We want our compost mix to be about 25 parts C to 1 part N (25:1).

# The CARBON Cycle




# The NITROGEN Cycle



# Our Compost Mixes

Fresh Plants
C:N = 22:1
Dry Plants
C:N = 79:1

Grass Clippings
C:N = 15:1

Vegetable Scraps
C:N = 19:1

Cow/Steer
Manure
C:N = 19:1

Spent Grain
C:N = 11:1

Leaves
C:N = 49:1

Coffee Grounds
C:N = 20:1

## Mix 1 (24:1)

2 Parts Fresh Plants
2 Parts Leaves
1 Part Manure

## Mix 3(25:1)

4 Parts Fresh Plants
4 Parts Veg. Scraps
1 Part Leaves
1 Part Manure

## Mix 5 (25:1)

6 Parts Dry Plants
2 Parts Spent Grain
1 Part Sawdust
4 Parts Manure

## Mix 2 (26:1)

2 Parts Dry Plants
1 Part Leaves
1 Part Coffee Grnds
1 Part Manure

## Mix 4 (27:1):

6 Parts Fresh Plants
1 Part Spent Grain
1 Part Sawdust
1 Part Manure

## Mix 6 (25:1)

3 Parts Dry Plants
1 Part Veg.
1 Part Coffee
1 Part Manure

These are the mixes we will be using.

Alton-Baker Community Gardeners ....


...hard at work...

...thoroughly mixing...

...various recipes  of our feedstocks.

# Get dirty!  Have fun!

**We are...**

# ...Open for Biness!

For more information contact Sherry Wellborn at the Eugene Community Garden Forum (http://eugenecommunitygardens.ning.com/) or at the Eugene Compost Specialists (http://extension.oregonstate.edu/lane/gardens/compost)
or Anne Donahue-City of Eugene Compost Specialist: anne.c.donahue@ci.eugene.or.us